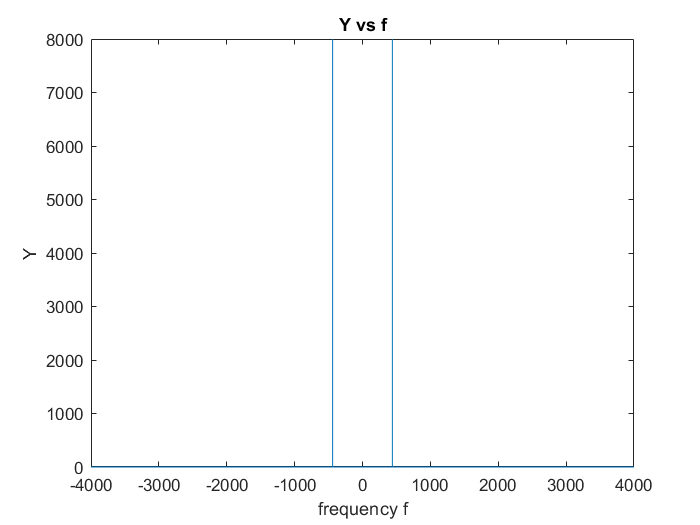
**Lab4**

**1.1.1.2**

By applying a discrete Fourier transform to the signal created using the existing function, the following image is obtained, and we can see that the frequency of the signal is concentrated at plus or minus 440Hz.

****

1. **Y vs f**

**1.1.1.3**

We can only correctly observe the notes which frequency is 0.5\*N Hz like “Note 31, 33, 42, 43, 45, 54, 55, 57, 67, 69, 81, 93, 96, 105” which are in the table.

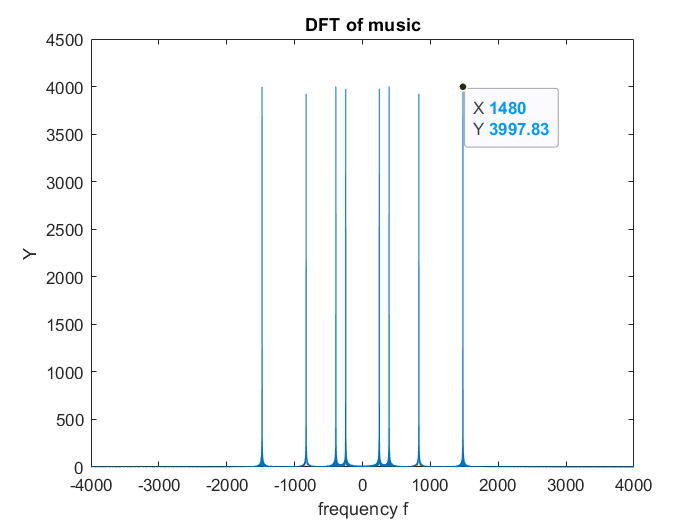
With the formula below, we can derive that the frequency of note 110 is 4698.64 which is not 0.5\*N Hz, so we can not observe it correctly.

The reason why we can’t do that is because of the function myFFT, the minimum step size of the frequency is 8000/16000 as 0.5.

f=(0:NFFT-1)'\*Fs/NFFT;

**1.1.2.2**

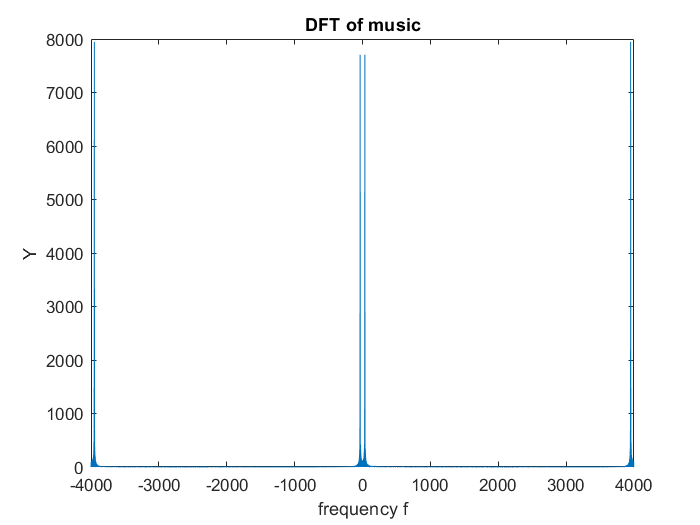
The figure of the signal is as below.



1. **DFT of the music**

**1.2.1.1**

We create a melody with note 25 and 107, the DFT figure of the signal is shown as below and the cutoff frequency I choose is 1000 Hz.



1. **DFT of the music**